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ABSTRACT

This study examined the effectiveness of Project Spectrum, an intervention program for at-risk students and an approach to assessment and curriculum development that identifies a child's area of strength and constructs the education and learning experiences around the child's competencies. A total of 119 students in 6 first grade classrooms participated in the study. In four intervention classrooms, students participated in Project Spectrum learning centers; in two control classrooms, they did not. To evaluate the program's effect on children's achievement, the study used a learning center behavioral measure, an academic achievement measure, a self-esteem measure, and a school adjustment measure. At-risk students were found to have higher self-esteem, better classroom adjustment, and higher levels of involvement when they were participating in the learning centers than when they were participating in regular classroom lessons. The at-risk children's attitudes and behaviors were significantly enhanced when they worked in their areas of identified strength. At-risk students in the intervention classrooms scored higher on the measure of school adjustment than did students in the control classrooms. The results suggest that children's feelings of competence and worth are integrally related to their demonstration of ability in an area of strength. Contains 23 references. (SM)

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# Building On Children's Strengths:

# Examination Of A Project Spectrum Intervention Program For Students At Risk For School Failure

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This paper has won the 1992 Dissertation Award of the National Association of Early Childhood Teacher Educators



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## Abstract

Project Spectrum aims to provide an innovative approach to assessment and curriculum development for the early years of schooling. The distinctive features of its approach include the identification of children's areas of strength and the construction of their education around those domains of competence. The purpose of the present study is to examine the effectiveness of a Spectrum-based intervention program for at-risk students.

A total of 119 first-grade students participated in the study: 85 were in four treatment classrooms and 34 were in two control classrooms; 15 of the students in the treatment and 8 in the control classrooms were identified as at-risk for school failure. Results indicate that the intervention was successful in certain specific areas. The opportunity to work in areas of strength was the most significant factor associated with at-risk students' improvements in self-esteem, classroom adjustment, and level of engagement. Although the at-risk children in the treatment classrooms did not show significantly greater gains on standardized measures of academic achievement or academic self-esteem when compared to students in the control classrooms, they did earn significantly higher scores on measures of school adjustment. The limitations of the study, implications of the results, and recommendations for future intervention research are discussed.

## Introduction

American schools are failing to provide adequate educational experience for an alarming number of students. Recent estimates suggest that 30% of American students in elementary and secondary schools are at risk for school failure and that this proportion will continue to rise in the future (Brodinsky & Keough, 1989; Letendre, 1990; Levin, 1988). Because of the rapid growth of this population, the challenge of meeting the educational needs of at-risk students has become especially daunting.

Although there is no single consensual definition of "at-risk," there are a number of widely mentioned "symptoms." These include poverty, poor nutrition, English language deficiency, low self-esteem, and low academic performance (Brodinsky & Keough, 1989; Comer, 1988; Willis, 1989). At the elementary level, "at-risk" often means that the student is in danger of failing to develop the skills required to complete his education (Center for Research on Elementary and Middle Schools [CREMS] 1989; Karen, 1990; Slavin, Karweit, & Madden, 1989; Slavin & Madden, 1989). These students often begin school without the skills needed to succeed in the standard school curriculum. Their self-esteem is low and their attitude toward school is poor (Becker & Carnine, 1980; Karen, 1990; Rutter & Garmezy, 1983). They frequently have behavioral problems, such as being excessively aggressive (Alexander & Malouf, 1983). Achievement scores of at-risk pupils are often considerably lower than those of their more advantaged peers (Letendre, 1990; Schorr, L. with Schorr, D. 1988).

A great deal of effort over the last two decades has focused on improving the well-being and educational performance of at-risk students. Among elementary school-linked intervention programs, the most widely used approaches include Chapter 1 compensatory education, tutoring programs, computer-assisted instruction, cooperative learning programs, the continuous progress model, and Accelerated School programs (Adams, 1992; Slavin, Madden, & Karweit, 1989).

A review of these programs suggests that certain key features characterize effective intervention for at-risk students. These features are: (1) careful and frequent assessment to determine students' needs and inform instructional decisions; (2) the delivery of instruction to individuals or small groups; (3) serving the needs of at-risk students through classroom-based support; (4) regarding peers as an important source of support in the learning process; and (5) recognition and reinforcement of students' success (CREMS, 1989; Levin, 1988, 1989; Slavin, Madden, & Karweit, 1989).

Although several key features of effective intervention have been identified, many problems must be addressed in order to better use limited resources and achieve greater success. First, most elementary school-linked intervention programs have been designed to ameliorate at-risk students' deficits and improve their academic performances. Such deficit-oriented models preclude recognition of at-risk children's strengths and fail to consider the possibility that these children may be different

rather than deficient (Zigler & Berman, 1983). Secondly, in terms of content, most elementary school-linked intervention programs focus primarily on performance in standard academic subjects, particularly in reading and math. Furthermore, within these areas, emphasis is often placed on the lower levels of basic skill and the instructional approach typically used is drill-and-practice. While it is undoubtedly necessary for students to master these fundamentals, their motivation to learn might be enhanced by exposure to a wider range of learning areas as well as greater variability in the instructional approach used. Finally, with regard to strategy, most elementary-school linked intervention programs rely exclusively on overcoming deficits in reading and math. While some at-risk students might benefit from this strategy, others might be more responsive to a different approach such as building on strengths. By using only one strategy, the very design of these programs may restrict their effectiveness.

The purpose of this study is to examine Project Spectrum's effectiveness as the basis for the design of an intervention program for students at risk for school failure. Project Spectrum, co-directed by David Henry Feldman of Tufts University and Howard Gardner of Harvard University, aims to provide an innovative approach to assessment and curriculum development for the early years of schooling. Project Spectrum's work is based on the view that cognitive ability is highly differentiated and significantly influenced by educational opportunities and context

(Feldman, 1980; Gardner, 1983). Central to the Spectrum approach is the identification of children's areas of strength and the construction of their education around those domains of competence.

Project Spectrum's approach to intervention ties to build on what has already been learned about effective intervention and addresses the problems such programs have encountered. The approach can be differentiated from existing programs in a number of ways (Adams & Feldman, in press; Krechevsky & Gardner, 1990). First, in contrast to approaches that describe at-risk children in terms of their deficits, Spectrum's intervention approach assumes that these children also have areas of strength, at least in relation to themselves. These areas of strength are believed to be useful as facilitators of learning in other subject areas. Drawing attention to at-risk children's areas of strength may change the perception of this population. It may also shift the focus of intervention away from an exclusive consideration of deficits.

Secondly, in terms of the content of intervention, rather than providing support only in academic areas as many programs do, Spectrum's approach includes a wide range of learning areas. Initially, this tactic gives children greater opportunities to demonstrate their strengths and interests. Over time, it enables children to further the development of their identified strengths and interests as well as explore other areas in which to apply their skills.

Finally, with regard to strategy, Spectrum's approach advocates building on children's strengths rather than focusing exclusively on remediation. This strategy is based on the argument that building on children's strengths will enhance self-esteem and improve school adjustment. According to Spectrum's position, as students develop a strong sense of their abilities, they are more willing to work on mastering other subject materials. Ultimately, their achievement in traditional academic areas will also improve (Project Spectrum, 1989). The purpose of the present study is to investigate the importance of identifying and nurturing at-risk children's strengths for the improvement of their self-esteem, school adjustment, and academic achievement.

**Design of the Study**

In the present study, a design of treatment versus control classrooms was used. In both treatment and control classrooms, a subset of students was identified as at-risk for school failure. In the treatment classrooms, a sub-group of at-risk students was further targeted for study because they demonstrated at least one area of strength.

All children in the treatment classrooms participated in the Spectrum-based intervention. Standardized measures of academic achievement, self-esteem, and school adjustment were administered before and after the intervention in both treatment and control classrooms. These measures were analyzed to determine the effectiveness of the Spectrum-based intervention. In addition to

the pre- and post-test comparisons between the treatment and control classrooms, at-risk and target students (at-risk students with identified areas of strength) in the treatment classrooms were further evaluated in terms of their self-esteem, classroom adjustment, and level of involvement in learning activities. These data were gathered through measures developed by Spectrum and classroom observations.

The Spectrum intervention program included three steps or components. They were: (1) expose children to different sets of learning materials; (2) identify and support children's strengths; and (3) bridge children's strengths to other subject areas and academic performance.

The first step in Spectrum's intervention program is to expose children to different sets of learning materials. This is accomplished through the introduction of "learning centers" into the classrooms. Spectrum learning centers are designed to encourage children to explore engaging materials in the domains of language, math, natural science, mechanical science, art, social understanding, music, and movement. Spectrum learning centers can be areas set aside for the specific purpose of carrying out activities within each area. They can also be a variety of supplementary materials available for children to explore.

For each Spectrum learning center, the treatment teachers received a Guide to Learning Center Activities. This guide includes a variety of activities; each is described in terms of

objectives, materials, and procedures. The Guide is provided to help the treatment teachers implement the Spectrum learning centers.

Spectrum's learning centers share certain features with the learning centers used in many quality early childhood programs. These features include the use of hands-on materials, the design of small group activities, and participation by choice. What distinguishes Spectrum's learning centers is the range of domains available and their systematic use for identifying and supporting children's areas of strength and interest.

The next step in the intervention process is to identify at-risk children's areas of strength through observations and analysis of their participation in a variety of school activities, including learning centers. At-risk children's strengths were identified on the basis of their demonstrated competence and interest in an area. Competence was evaluated in terms of "key abilities." Key abilities refer to those abilities of central importance to success in a particular domain, such as numerical reasoning and logical problem-solving in math, or body control and sensitivity to rhythm in movement. Interest was assessed in terms of the frequency that a child chose a particular learning area and the length of involvement in a learning area.

Once a child's area of strength was identified, further experience in that area and support are provided to enhance and develop his or her strength. This support includes encouraging

the child to explore the area further, inviting the child to be a group leader in this area, and talking to the parents about their child's strength. As the child develops further competence in his areas of strength, he is likely to attain feelings of satisfaction and self-worth. These feelings, in turn, are believed to help the child develop confidence and a positive self-image (Project Spectrum, 1989).

The third and final step involves extending the child's experiences in his areas of strength to support his engagement in a wider range of learning areas. The Spectrum research team refers to this process as "bridging." Bridging may occur in a number of ways during the child's learning process. For example, if a child is interested in tools, he can be asked to write a tool dictionary. In this example, the content of the child's area of strength is used as a vehicle for practicing and developing the child's writing skills. As another example, if a child sings well and likes to sing, he or she could be encouraged to use familiar melodies to play number games.

**Research Predictions**

Because Spectrum learning centers offer a variety of materials and modes of activity (e.g., drawing, assembling objects, moving creatively) and are participated in by choice, it is reasonable to predict that children will exhibit higher levels of involvement, interest, attentiveness, and persistence during learning center time compared to regular classroom lessons.

Higher levels of involvement and improved classroom adjustment should mean that children are less likely to be disruptive or pose discipline problems. Furthermore, because much of the children's activity in learning centers is self-directed and has no right and wrong answers, children are less likely to experience the self-devaluation caused by the inability to understand or complete work required in regular classroom lessons.

When children work in an area of strength during learning center time, they are expected to show a higher level of involvement because their knowledge, skill, and interest in the area enable them to more careful monitor their performance and highly engage in the activities. Children's ongoing demonstration of competence also provides a substantive basis for their participation in discussions and enables them to help others who are less skilled in the area. Further, the recognition of children's competence by the teacher and peers enables children to see themselves as capable in the school environment and their self-esteem is thus enhanced in this process. These markers of improved classroom adjustment and increased self-esteem could indicate that children see themselves as more valuable members of the classroom.

As children develop a sense of themselves as valuable members of the classroom, their increased self-esteem and improved classroom adjustment are expected to become visible in other classroom activities. Similarly, as students develop a

strong sense of their abilities, they are expected to challenge themselves more in other areas of learning. Simultaneously, the intervention program calls for teachers to build on children's strengths to facilitate their achievement in other academic areas. The combined effort of students and teachers is expected to result in significant improvements in at-risk students' academic performance.

Based on these arguments, the following research predictions were formed:

1. Within the treatment classrooms, at-risk students will score higher on measures of self-esteem, classroom adjustment, and level of involvement during learning center time versus regular classroom lessons.

2. During learning center time, target students (at-risk children who have an identified area of strength) will score higher on measures of self-esteem, classroom adjustment, and level of involvement when they are working in an area of strength versus when they are working in other areas.

3. There will be significant improvement in scores on measures of academic achievement, self-esteem, and school adjustment from pre- to post-intervention in the treatment classrooms when compared to the control classrooms. Further, there will be significant improvement in scores on these measures when at-risk children in the treatment and control classrooms are compared.

## Methods

### Subjects

Six first-grade classrooms with a total of 119 students participated in the study: 85 students were in the four treatment classes; 34 were in the two control classes. All of the children resided in Somerville, Massachusetts, a low socio-economic residential area with some ethnic diversity.

Of the 119 subjects, 15 in the treatment classrooms and 8 in the control classrooms were considered at risk for school failure. Their at-risk status was determined by teacher evaluations in consultation with Spectrum researchers. The teachers identified children to be at-risk on the basis of four factors: difficulty in meeting the curricular goals of kindergarten; low self-esteem; inappropriate classroom behavior; attitudinal problems. Scores on pretests (two reading achievement tests, one math achievement test, a measure of academic self-esteem, and a measure of school adjustment) were used to verify the identification of children as being at-risk. Twelve of the 15 children identified as at-risk placed at or below the bottom 25% on at least 3 of the 5 measures when compared with the rest of their classmates in the study.

Among the students in the treatment classrooms identified as at-risk, a subset was identified as having an area of strength. As described earlier, strengths were identified through observations and analysis of children's participation in a variety of school activities, including a range of different

learning center activities. Thirteen of the 15 at-risk students (87%) were identified as having at least one area of strength in relation to either classmates or self and thus became target subjects.

**Procedures**

Because treatment teachers were responsible for the implementation of the intervention program, explicit procedures were designed to train them and support their on-going efforts. Prior to the intervention period, a two-day training workshop was held for the treatment teachers. At the beginning of the school year, Spectrum researchers met with treatment teachers to discuss classroom designs that would facilitate program implementation. During the intervention period, Spectrum researchers and treatment teachers met regularly to discuss progress and problems regarding the program implementation. At the end of the intervention, an exit interview was conducted with both treatment and control teachers. All of these procedures were designed to help teachers understand Spectrum's approach and assist them in becoming proficient in the use of Spectrum's resources.

The four treatment teachers introduced Spectrum learning centers into the classrooms at the beginning of September, 1990 and implemented them throughout the school year. From mid-September to mid-November, teachers presented materials from each of the learning centers to the children at group meetings. Immediately following the group meeting, children explored the

materials that had been presented. This introductory period served three purposes. It acquainted the children with the procedure for choosing and carrying out activities in the learning centers without direct teacher supervision. It gave children an early opportunity to explore all of the domains, particularly those of special interest. Finally, it enabled teachers to gain an initial sense of children's strengths and interests.

Following this introductory period, the particular implementation of Spectrum learning centers varied from teacher to teacher. For instance, one teacher opened 2 to 4 learning centers twice a week for an hour at a time throughout the year. Another teacher had some learning centers available for the children all the time. Third teacher often incorporated learning centers into the units and projects that she planned. This variability in implementation should be considered when the result of the study are evaluated.

Each teacher's selection of the centers opened depended on a number of factors: the particular strengths and interests of children in the group; on-going projects and themes in the regular curriculum; and logistical issues such as accessing materials and having sufficient time to prepare for their use. As the year progressed, most teachers made each center available for roughly the same amount of time so that no one center was highlighted at the expense of another. This procedure insured that all children had an opportunity to discover and work in an

area of interest and strength.

During the learning center introduction period, the teachers often assigned children to particular centers. As the children gained more exposure and experience, the teachers provided more opportunities for the students to choose an area or activity. When the children became more accustomed to working independently, the teachers were better able to circulate among centers to observe children and to work with individual children or small groups.

## Measures

**Learning Center Behavioral Measure**. A Child Observation Sheet (Project Spectrum, 1990) was developed to guide observations of the at-risk students in the treatment classrooms for both learning center time and regular classroom lessons. The three categories recorded on the Child Observation Sheet are: self-esteem, classroom adjustment, and level of involvement. Each of these three categories is defined in terms of two observational items, yielding a total of 6 items. These 6 items are self-direction, self-confidence, positive classroom behavior, positive affect, self-monitoring, and activity engagement. A Likert scale for each category ranged from 1 to 5, with 1 and 2 referring to negative aspects, and 4 and 5 to positive aspects of the variable; a rating of 3 was used to indicate "not clear" (i.e., the child exhibits both negative and positive aspects, making interpretation unclear). Pearson correlations were used

to test the interrater reliability of ratings by two observers. Correlation coefficients were found to be .81, .89, and .91 for the categories of self-esteem, classroom adjustment, and working styles respectively. Use of the Child Observation Sheet was supplemented by more descriptive observations.

**Academic Achievement Measure.** Academic skills were assessed by administering the Survey of Basic Skills or SBS developed by Science Research Associates (1985). The SBS is a group-administered, multiple-item, paper-pencil battery surveying general academic achievement. The first-grade battery measures basic skills taught in reading and math. SBS forms 20 and 21 were used for the pre- and post-test respectively. Tests were sent to SRA to be scored.

**Self-Esteem Measure.** To measure the academic self-esteem of the student, the Behavioral Academic Self-Esteem Rating Scale or BASE (Coopersmith & Gilberts, 1982) was administered. The BASE is a five-item checklist designed for use by classroom teachers. The five items in the measure are student initiative, social attention, attitude toward success/failure, social attraction, and self-confidence. Each item is comprised of several sub-items. Based on a 5 point rating scale, with 1 referring to "Never" and 5 to "Always", the classroom teachers check the number that best estimates the frequency with which they note that particular behavior in the student. After scoring each sub-item, teachers calculate scores for each of the five items in the scale.

**School Adjustment Measure**. The Clymer-Barrett Developmental Checklist or CBDC (Clymer & Barrett, 1983) was chosen to evaluate the student's school adjustment. The CBDC is a teacher-reported, multi-item checklist with low, medium, and high levels on each item. Student's school adjustment is measured primarily in terms of their emotional status, attitudes toward learning, work habits, and social skills.

**Administration of Measures**. Both treatment and control students participated in the group-administered, pre- and post-measures. All pretests were conducted in September, 1990; the post-test measures were administered in May, 1991.

In each of the four treatment classrooms, weekly observations of the at-risk children were conducted by student observers and Spectrum staff during both learning center time and regular classroom lessons. After each observation, student observers and Spectrum staff completed a Child Observation Sheet and wrote a detailed observational report.

## Comparability of Treatment and Control Classrooms

At pre-test, students in treatment classrooms were not significantly different from their counterparts in control classrooms on the measures of math basic skills, self-esteem, or school adjustment. However, the treatment classrooms obtained significantly higher scores on tests of basic skills in reading than the control classrooms did.

When at-risk children in the treatment and control

classrooms were compared at pre-test, no significant differences were found between the two groups on the measures of math basic skills or self-esteem. The two groups did differ in their scores on the reading skills test and the school adjustment measure. The at-risk children in the treatment classrooms earned higher scores on the reading test; the at-risk children in the control classrooms scored higher on the school adjustment measure. These differences as well as those differences reported above must be taken into account when considering any treatment and control comparisons at post-test.

## Results

### Effects of Spectrum Learning Centers

In comparing learning centers to regular classroom lessons within treatment classrooms, Multivariate Analyses of Variance indicated that there were significant differences. During learning center time, the at-risk children were found to show higher self-esteem ($F(1,28)=11.29$, $p<.01$), improved classroom adjustment ($F(1,28)=15.32$, $p<.01$) and higher level of engagement ($F(1,28)=17.58$, $p<.01$) than they did during regular curriculum lessons. Specifically, the at-risk children had significantly higher scores during learning center time on 4 of the 6 items; namely, self-direction ($F(1,28)=15.09$, $p<.01$), classroom conduct ($F(1,28)=5.48$, $p<.05$), positive affect ($F(1,28)=16.15$, $p<.01$), and activity engagement ($F(1,28)=40.28$, $p<.01$). These results indicate that, during learning center time, the at-risk children

demonstrated greater interest and engagement in activities, often undertook new tasks voluntarily, worked well without adult support, and had fewer classroom behavior problems than during regular classroom activities.

**Table 1. Mean Scores of At-Risk Students' Behavior in Learning Center Time and Regular Classroom Lessons**

| | Learning Center | Classroom Lesson |
|---|---|---|
| Self-Esteem | | |
| Self-Direction | 3.02** | 2.03 |
| Self-Confidence | 2.87 | 2.49 |
| Adjustment | | |
| Positive Classroom Behavior | 3.13* | 2.44 |
| Positive Affect | 3.52** | 2.43 |
| Level of Involvement | | |
| Self-Monitoring | 2.63 | 2.48 |
| Activity Engagement | 3.74** | 2.38 |

** <.01 significance level, * <.05 significance level

**Effects of Working in Areas of Strength**

Table 2 presents areas of strength identified for the 13 target children. While some strengths were identified in relation to a child's own profile of relative strengths, others were relative to the class. As noted in the table, the target

children's strengths spanned many areas, including art, mechanical, social, math, language, science, and movement. Also noteworthy, the target children demonstrated more strengths in non-academic areas (6 in art, 3 in mechanical, and 3 in movement areas) than in academic ones (2 in language and 1 in math areas).

**Table 2. Identified Areas of Strength Across Domains**

| Area | Areas of strength compared to the rest of the class | student's other abilities | Total |
|---|---|---|---|
| Math | | 1 | 1 |
| Social | | 1 | 1 |
| Science | 1 | 1 | 2 |
| Language | 2 | | 2 |
| Movement | | 3 | 3 |
| Mechanical | 2 | 1 | 3 |
| Art | 2 | 4 | 6 |

Multivariate Analyses of Variance indicated significant differences between children's working in strength areas versus in non-strength areas during learning center time (see table 3). When working in areas of strength, the target children obtained significantly higher scores on measures of self-esteem ($F(1,24)=57.37$, $p<.01$), classroom adjustment ($F(1,24)=28.39$, $p<.01$), and level of engagement ($F(1,24)=31.17$, $p<.01$). More

specifically, the target children earned higher scores on all six observational items (self-direction, $F(1,24)=40.19$; $p<.01$, self-confidence, $F(1,24)=42.83$, $p<.01$; positive affect, $F(1,24)=24.69$, $p<.01$; classroom conduct, $F(1,24)=14.65$, $p<.01$; self-monitoring, $F(1,24)=25.41$, $p<.01$; and activity engagement, $F(1,24)=16.40$, $p<.01$). Furthermore, an analysis of individual subject's data indicated that all of the target children showed statistically significant differences on at least one, and in some cases as many as 5, of the aforementioned behaviors. This result suggested that all of the target children had more positive experiences when working in areas of strength.

**Table 3. Mean Scores of Target Students' Behavior When Working in Areas of Strength and Non-Strength Areas**

| | Areas of Strength | Other Areas |
|---|---|---|
| Self-Esteem | | |
| Self-Direction | 3.98** | 2.25 |
| Self-Confidence | 3.96** | 2.30 |
| Adjustment | | |
| Positive Classroom Behavior | 3.67** | 2.40 |
| Positive Affect | 3.96** | 2.58 |
| Level of Involvement | | |
| Self-Monitoring | 3.19** | 1.87 |
| Activity Engagement | 4.26** | 3.17 |

** <.01 significance level

**Effectiveness of the Spectrum Treatment**

When a Repeated Measures of Analysis of Variance was used, no significant differences between the treatment and control classrooms were found from pre- to post-test on any of the three measures administered in the study. More specifically, children's scores in the treatment classrooms did not differ from those of their counterparts in the control classrooms on the measures of basic skills (reading -- $F(1,216)=0.17$, $p$ n.s., math -- $F(1,215)=1.18$, $p$ n.s.), academic self-esteem ($F(1,217)=0.11$, $p$ n.s.) or school adjustment ($F(1,213)=1.14$, $p$ n.s.).

When the at-risk students in the treatment classrooms were compared to the at-risk students in the control classrooms, again, no significant differences were found on tests of basic skills (reading--$F(1,41)=.15$, $p$ n.s., math--$F(1,41)=.06$, $p$ n.s.) or academic self-esteem ($F(1,41)=.53$, $p$ n.s.). However, on the measure of school adjustment, at-risk children in the treatment classrooms did show greater improvement than their counterparts in the control classrooms ($F(1,41)=5.85$, $p<.05$).

Further analyses revealed that the greater gain of the treatment at-risk students on the measure of school adjustment was a function of the higher scores they earned on 3 of the 8 items included in the test. Compared with the at-risk students in the control classrooms, the at-risk students in the treatment classrooms (1) enjoyed school more and showed more positive attitudes toward learning ($F(1,41)=7.47$, $p<.01$); (2) participated in classroom discussions more often and were more willing to express their personal needs ($F(1,41)=4.66$, $p<.05$); and (3) demonstrated greater interest and were more engaged in school

activities ($F(1,41)=7.74$, $p<.01$).

With regard to reading scores on the basic skills test, finding no significant difference between treatment and control classrooms warrants closer examination. As reported in the Methods section, the control classrooms (both the whole class and the at-risk children) had lower reading scores than the treatment classrooms at pre-test. Although the control classrooms did experience greater gains in reading scores, a magnitude of change test indicates that these gains were not significantly different from those in the treatment classrooms, either for the at-risk children or for the classes as a whole.

## Discussion

In the present study, at-risk children were found to have higher self-esteem, improved classroom adjustment, and higher level of involvement when participating in Project Spectrum designed learning centers as compared with regular classroom lessons. Further, the at-risk children's improvements in attitude and behavior were significantly enhanced when they worked in their identified areas of strength. Finally, the at-risk children in the treatment classrooms earned significantly higher scores on measures of school adjustment when compared to students in the control classrooms. They did not, however, show significantly greater gains on measures of academic achievement or academic self-esteem.

The results of the present study therefore did not provide much support for the prediction of significantly greater gains in achievement test scores for the treatment classrooms. A closer

examination of the design and execution of the program suggest several factors that may help to account for the results obtained. One possible source of explanation was the length of the intervention period. The present study was conducted for one academic year; however, it has been documented that it requires a much longer period to effect the changes necessary to significantly improve students' mastery of basic skills (Comer, 1988; Levin, 1989; Tharp & Gallimore, 1982).

The second factor related to the measure used to evaluate the program's effect on children's achievement. In the present study, the only measure used was a standardized achievement test (SBS). This kind of test was chosen for two reasons: (1) Standardized tests are the most widely used means of assessing the effectiveness of an intervention program, and (2) the long-range goal of the Spectrum intervention program is to improve students' achievement in the areas measured by these tests.

Although improving at-risk children's performance in traditional academic areas is the long-range goal of Spectrum's intervention program, working in an area of strength is seen as a necessary step toward that goal. However, little systematic information about children's work in their strength areas was recorded. If it could be shown that children made progress in their area of strength, this might suggest that Spectrum's intervention program was more effective than the achievement test scores indicate. In addition to standardized achievement tests, other measures are needed to document children's progress in their strength areas. Ideally, these measures would include such features as using media appropriate to particular domains,

gathering information over a longer period of time, and recording information through a variety of means (e.g., portfolios, video tapes of children's activity, observations).

Another limit of the present study was its small sample size. In the present study, a total of only 15 students were identified as being at-risk for school failure in the treatment classrooms and only 8 such students were identified in the control classrooms. This small number of subjects makes the finding of statistically significant differences between the treatment and control classrooms less likely; i.e., a conservative design. It also limits the generalizability of the findings. Finally, small numbers of subjects make it difficult to run any micro-analyses. For instance, in the present study, it was not possible to compare at-risk children with identified strengths to those without identified strengths (only 2 subjects). This kind of analysis might have yielded more information about the effect of working in areas of strength.

Finally, in terms of the data gathering process, it would be preferable to take steps to insure greater independence in the identification of strengths versus the rating of child's behavior. In the present study, areas of strength were identified on the basis of a child's demonstrated competence and interest in an area as defined by key abilities, and the learning center behavioral measure was used to rate children's behavior when they were working in areas of strength. However, Spectrum researchers were involved in <u>both</u> the identification and the observation of children's work in areas of strength and the context of learning centers was used in both cases. As a result,

it is possible that the same factors were drawn on in identifying strengths and in characterizing approaches to work in areas of strength.

## Conclusion

The findings of the present study contribute to the field in several ways. In contrast to the typical description of at-risk students as a deficient population, areas of strength were identified for 13 of the 15 (87%) at-risk students in the treatment classrooms. This finding suggests that although at-risk students may be deficient in some respects such as reading or math, they are not necessarily deficient in all respects. When a wide range of learning areas is available for them to explore and to pursue, at-risk children demonstrate competence and skills in a variety of areas. Drawing attention to at-risk children's areas of strength offers a promising alternative to the typical characterization of this population as deficient.

In contrast to a focus on deficits, Spectrum's strategy of building on children's strengths diversifies the content of intervention and provides alternative means for children to develop basic skills. The fact that children responded so quickly and positively to the Spectrum learning centers provides evidence that the narrow focus of some intervention programs is limiting the opportunities that children have to be engaged and enjoy learning. In the intervention program, Spectrum learning centers initially made it possible to observe children's abilities and interests in a wide range of areas. As the study progressed, the centers were used to provide support for the

development of children's identified strengths and interests. By providing experience in a wide range of areas, Spectrum learning centers also provided children many opportunities to explore, to enjoy learning, and to feel successful.

In this study, at-risk students, when working in their areas of strength, were more self-confident and self-directed, showed more positive behavior and affect, and were more reflective and engaged. Over the course of a child's education, these behaviors and positive attitudes toward learning may be as important as their level of skill. It would be difficult to overemphasize the importance of identifying and building on children's areas of strength. The present study suggests that children's feelings of competence and worth are integrally related to their demonstration of ability in an area of strength. At the very least, a child's involvement in an area of competence means that the child will not feel completely inadequate. At best, a child's areas of strength can be used as a means to develop academic skills and to express one's unique potential, although that claim remains to be demonstrated empirically.

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